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(54) **SEAT**

(57) A seat (10), the frame of whose backrest (11) and/or seat part (12) includes at least two tubes (21a, 21 b, 22a, 22b) or bars, in connection with which structural parts (30), which have holes (32) for the tubes of the frame of the backrest and/or the frame of the seat part, can be installed. The structural part has, in connection with the hole, a shoulder (33) on which the bushing (34) of the adjacent structural part rests so that a gap remains between the structural parts. Most advantageously, the structural part has been made of plastic, and there can be a padding (35) on top of it.

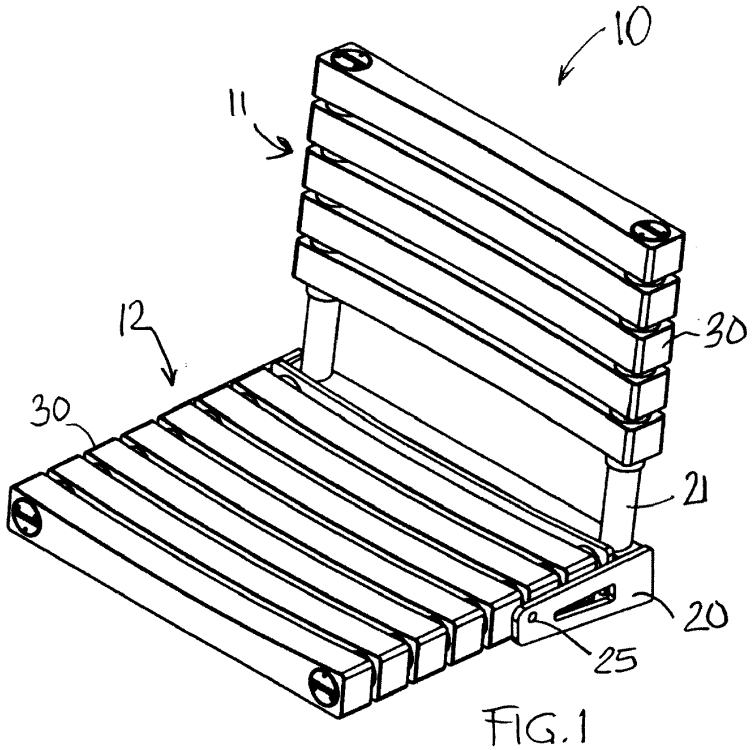

FIG. 1

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Description

[0001] The object of the invention is a seat according to the preamble to claim 1.

[0002] Prior art publications EP0267859A2 and EP3050465A1 present seats in which the seat part and/or backrest are manufactured from several separate structural parts. These structural parts are elongated pieces which have two holes such that they can be inserted and placed in the tubes or bars located in the frames of the seat part and/or backrest. The structural parts are thereby located close to one another in the seat so that the ends of the elongated structural parts are directed to both sides of the seat. In both the solutions presented in the mentioned publications, slits have been created between the structural parts so that intermediate pieces are located in between adjacent structural parts. In the publication EP0267859A2 the intermediate pieces between the structural parts are different to one another in that the cross sections of the intermediate pieces are either rectangular or trapezoidal in shape. Using intermediate pieces of different shapes, the seat part or backrest formed from the seat's structural parts can be made curved as required.

[0003] The above-presented prior art solutions are, however, complicated, and their manufacture and assembly is difficult because in the known solutions there are many different and differently-shaped shapes. The purpose of the invention is to create a seat that is simpler and less expensive than known solutions. Furthermore, the purpose of the invention is to create a seat whose manufacture and assembly can be carried out significantly more efficiently than in known solutions because the seat according to the invention can be assembled from simple and low-cost parts.

[0004] The seat according to the invention is characterised in what has been presented in the characteristics section of claim 1. The seat has, in the frame of the seat's backrest and/or frame of the seat part, at least two tubes or bars and structural parts that are elongated pieces with holes for the tubes or bars. The structural parts are installed onto the seat so that the tubes or bars go in the structural parts' holes.

[0005] Most advantageously the seat according to the invention has been formed from structural parts in which the seat's structural part has a protrusion that rests on the adjacent structural part so that a gap is left between the structural parts. The protrusion has been formed in connection with the structural part's hole so that it is a bushing in which case the tube or bar that belongs to the seat goes through both the hole and the bushing that forms the protrusion. There is also a recess in connection with the structural part's hole on which the bushing that forms the protrusion of the adjacent structural part rests.

[0006] According to the invention, the recess in connection with the structural part's hole is conical and similarly the protrusion resting on the recess is also conical. Thus when installing the structural parts in place, the conical protrusion locks tightly into the conical recess of the adjacent structural part. The inclination of the wall of both the protrusion and the recess that comes against it is most advantageously 1°.

[0007] The size of the gap that remains between the structural parts next to the seat can be adjusted by changing the dimensions of the cones of the protrusion and/or recess so that the protrusion penetrates only to the required depth in the recess. If the protrusion and recess are dimensioned so that the protrusion can penetrate all the way to the shoulder located at the bottom of the recess, the size of the gap remaining between the structural parts can be adjusted by changing the length of the bushing and/or depth of the recess. By adjusting these above-mentioned dimensions, it is possible to get the structural parts to touch one another if so desired.

[0008] In connection with the tube or bar of the frame of the seat's seat part and/or frame of the backrest there is a stopper against which the first structural part to be installed on the seat part or backrest rests. When all of the structural parts are installed in connection with the tubes or bars, they are locked in place so that a locking member is installed on the end of the tube or bar. Most advantageously the locking member is a locking screw which is screwed into the locking nut in connection with the end of the tube. In this case the locking screw's head rests on the structural part last installed on the tube or bar. When the locking screw is tightened, it pushes all of the structural parts installed on the tube or bar against the stopper on the tube or bar. This causes all of the structural parts to be squeezed against one another and the conical protrusions of the structural parts to penetrate into the conical recesses of the adjacent structural part, as a result of which the structural parts lock tightly together. This method of installation has the excellent benefit that when the seat is used its structural parts' joints do not become loose, instead they remain firmly in place throughout the lifetime of the seat.

[0009] A hole in the structural part that is the last to be installed in connection with the tube or bar can be covered with a plug. Most advantageously, the hole is covered, however, with the structural part's fastening member, such as the above-mentioned locking screw. The head of the fastening screw located in connection with the last structural part to be installed and that is placed at the end of the tube of the backrest's and/or seat part's frame is most advantageously shaped so that it fits into the depression in the structural part.

[0010] The seat according to the invention is most advantageously an outdoor seat such as a seat in a sports arena or the seating area of some other space, which has been permanently installed into the seating area's structures. The seat can also be installed as a park bench or in any outdoor area. It is also suitable for indoors and for public spaces such as waiting rooms. The seat according to the invention can also be used as a vehicle seat. When installed in the seating area of a sports arena, and in other cases as well, the tubes of the seat part can

be connected to the frame of the seat part so that the tubes of the seat part and the structural parts connected thereto turn upwards due to the impact of gravity when the seat is unoccupied.

[0011] Most advantageously the structural part of the seat is manufactured from plastic either by injection moulding or compression moulding. A structural part manufactured in a mould is an elongated piece in which the structural part's frame and its protrusions form a single continuous piece. When manufactured in a mould, it is advantageous to make the structural part a structure that is open on one side, inside which there are support structures formed by crosspieces. The edge portions of the open structure can be made thicker so that they better sustain the weight of a seated person and stand up to any malicious attempts to break the seat.

[0012] The structural part of the seat can have attached to it padding and/or the structural part may be coated with a coating layer. The padding can also be glued or connected to the structural part's recess with detachable fasteners.

[0013] A seat or seat frame equipped with structural parts can also be attached to a beam to which other similar seats can also be attached so that the seats together form a module that can be installed in one piece.

[0014] The dimensions of the seat's structural parts can vary such that some structural parts are longer or wider than others. The same seat can have structural parts of different sizes, for example, so that the upper part of the backrest and front part of the seat part have wider structural parts and elsewhere the seat has more narrow structural parts. In this case, the wide structural parts can be, for example, 120 mm wide and the other structural parts in the seat, for example, 40 mm wide. Other alternative combinations are also possible.

[0015] The shape and curvature of the seat's structural parts can also vary greatly. In this case, the structural part can be either completely straight or curved so that the upper surface of the seat part and/or surface that is located against the back of the backrest is, for example, concave. Other forms of curvature are also possible.

[0016] The fastening methods for the structural parts can also vary. According to the invention, the place and locking of the structural parts is done so that, for example, a stopper or other frame part, against which the first structural part to be installed is pressed, is welded to the frame's tube or bar. The stopper can thus be, for example, a flange attached to the tube. The structural part to be installed on the tube or bar is locked in place on the end part of the tube or bar. The end locking is carried out so that all of the structural parts installed on the tube or bar are locked in place between the stopper and end locking.

[0017] The end locking member can be most advantageously a screw with which the outermost structural part is locked. The locking of the outermost structural part takes place, for example, so that a locking nut is attached or wedged inside the tube onto which the locking screw that locks the outermost structural part is tightened. The locking screw to be wedged inside the tube can have sharp ends that dig into the tube's inner wall when the locking screw is tightened. Most advantageously, the locking screw has a broad flat head that can be sunken into the structural part's recess so that the head of the screw is at the same level as the surface of the structural part. The screw can also be made such that a special key, which has, for example, three pins in it, is required to open it. The pins of the key can be fitted into the three recesses of the locking screw. This prevents the malicious opening of the locking screw.

[0018] Structural parts manufactured from plastic can easily be made from different colours and the manufacturer's name or some other text can be attached to them. When the seat's structural parts are made from plastic, the mould for the structural part can be made so that the parts of the seat that are subject to high loads in use are made stronger beforehand. Points such as this are, for example, the edge portions of the structural part's long sides where the thickness of the walls can thus be made thicker and stronger at the required points.

[0019] In the following, the invention is described using examples with reference to the appended drawings, in which

LIST OF FIGURES

[0020]

Figure 1	shows an oblique side view of a seat according to the invention.
Figure 2	shows a top view of the seat of Fig. 1.
Figure 3	shows a side view of the seat of Fig. 1.
Figure 4	shows an oblique side view of the seat of Fig. 1 with the seat part raised
Figure 5	shows a side view of the seat of Fig. 4.
Figure 6	shows a top view of the structural part of the seat according to the invention.
Figure 7	shows a side view of the structural part of Fig. 6.
Figure 8	shows the structural part of Fig. 6 seen from the other side.
Figure 9	shows an oblique side view of the structural part of Fig. 6.
Figure 10	shows an end view of the structural part of Fig. 6.
Figure 11	shows a sectional view of Fig. 8 along the line XI-XI.
Figure 12	shows a sectional view of Fig. 2 along the line XII-XII.
Figure 13	shows a partly sectional view of the seat in Figure 4.
Figure 14	shows a sectional view of two structural parts connected to one another.
Figure 15	shows a sectional schematic view of a part of the seat.
Figure 16	shows a sectional view of the structural part according to the invention.

Figure 17 shows a sectional schematic view of a part of the seat.

Figure 18 shows a sectional schematic view of a part of the seat.

Figure 19 shows a side view of the seat's structural part.

Figure 20 shows a side view of the seat's structural part equipped with padding.

DESCRIPTION OF THE FIGURES

[0021] Figure 1 shows a seat 10 according to the invention, in which structural parts 30 according to the invention have been used in both the backrest 11 and the seat part 12. In Figure 1, the structural parts 30 are essentially identical pieces with two holes such that the structural parts 30 can have been inserted and placed next to one another into the tubes 21 located in the seat frame 20. Bars may also be used in place of tubes. The structural parts 30 placed outermost in both the backrest 11 and the seat part 12 can be locked and the holes can be covered with locking screws or plugs such that their holes will not remain visible. The outermost structural parts 30 can be identical with the other structural parts 30, but they can also be of different sizes, for example, wider than the other structural parts.

[0022] From Figure 1 it can be seen that in the seat 10, between the structural parts 30, there is a small gap that has been achieved such that the structural parts 30 have bushing-like protrusions in conjunction with the holes. The bushing-like protrusions can be formed permanently already at the manufacturing stage in the structural parts 30 The structure of the seat frame 20 and the structural parts 30 are described in more detail hereinafter.

[0023] Figure 2 shows a top view of a structural part 30 of the seat 10 according to the invention and Figure 3 shows a side view of the seat.

[0024] Figure 4 shows an oblique side view of the seat 10 of Figure 1 with the seat part 12 raised when the seat is unoccupied. Figure 5 shows a side view of the seat 10.

[0025] Figure 6 shows a top view of the structural part 30 of the seat 10 according to the invention. The structural part 30 has protrusions 34 in connection with the holes. Figure 7 shows a side view of the structural part 30 of Figure 6. At both ends of the structural part 30 there are holes 32 and protrusions 34 in connection with them.

[0026] Figure 8 shows the structural part 30 of Figure 6 seen from the open side. The structural part 30 is manufactured, for example, by injection moulding in a mould in which case the other side is formed to be open. Figure 8 shows the support trusses 36 inside the structural part 30. Figure 9 shows the structural part 30 of Figures 6-8 seen obliquely from the open side.

[0027] Figure 10 shows an end view of a structural part 30 of Figure 6 and Figure 11 shows a sectional view of the structural part 30 at the hole 32. The structural part 30 includes a protrusion 34, which rests on the adjacent structural part when installed in the seat. The hole 32 is conical such that its walls are inclined by approximately 1°, in which case, due to the inclination, the diameter of the hole 32 is smaller at the end closer to the protrusion 34. Similarly, also the outer walls of the protrusion 34 are inclined at the same angle of inclination of approximately 1° as the walls of the hole 32. In this case, the diameter of the protrusion 34 is smaller at the end of the protrusion 34 due to the inclination.

[0028] Figure 12 shows a sectional side view of the seat 10 in which case Figure 12 shows how the structural parts 30 are installed in the seat 10. The structural parts 30 are threaded onto the tubes 21 or corresponding bars so that the tubes 21 go into the holes 32 of the structural parts 30. Figure 13 shows a sectional view of the seat and the raised seat part 12.

[0029] Figure 14 shows a sectional view of two structural parts 30 joined together in a similar way as they are joined together in the seat 10. In this case, the end of the structural part's 30 conical protrusion 34 that has a smaller diameter has been pushed into the conical hole 32 of the adjacent structural part 30. The diameter of the hole 32 is larger at the end from which the protrusion 34 penetrates into the hole 32. When the conicalities of both the protrusion 34 and the hole 32 are identical, the protrusion 32 fits well into the hole 32 and locks to its conical surface.

[0030] Figure 15 shows a sectional schematic view of the seat part 12 of the seat 10. Figure 15 shows only three structural parts but completed seats may have a varying number of these. Figure 15 shows that the structural part on the left of the figure rests on the stopper 27 on the tube 21. At the opposite side, on the right in the figure, the structural part 30 is locked with a locking screw 28, which can be turned in the locking nut 29 on the tube 21. In this case, the structural parts 30 are squeezed between the stopper 27 and locking screw 28 in which case the conical protrusions 34 and the conical holes 32 of the structural parts are locked together.

[0031] Figure 16 shows a sectional view of the structural part 30 according to the invention. The protrusion 34 of the structural part 30 has a conical outer surface 38 and the hole 32 has a corresponding conical inner surface 37 at least in the part of the hole into which the protrusion 34 of the adjacent structural part penetrates. The hole 32 also has a shoulder 33 for the protrusion 34 and another shoulder 35 for the head of the locking screw 28.

[0032] Figure 17 shows a sectional schematic view of the structure of the seat part 12 of the seat 10. For the sake of clarity, the figure shows only two structural parts 30 but the seat 10 has several of them. Figure 17 shows that the conical outer surface 38 of the structural part's 30 protrusion 34 has been penetrated into a space in the hole 32 which has a similar conical inner surface 37. The structural parts 30 have been squeezed between the stopper 27 and the locking screw 28, causing the conical parts of the structural parts to be locked. In Figure 17 the protrusion 34 has been pushed against the shoulder 33

but it can also be arranged with the dimensioning of the conical surfaces that the conical surfaces of the protrusion 34 and hole 32 lock together already before the protrusion 34 is pushed up to the shoulder 33.

[0033] Figure 18 shows a schematic view of the structure of the seat part 12 of the seat 10, in which the conical outer surface 38 of the protrusion 34 of the structural part 30 has been penetrated into the space inside the hole 32 of the adjacent structural part 30, which has a corresponding conical inner surface 37. Here, the conical surfaces of the protrusion 34 and hole 32 have locked together even before the protrusion 34 has penetrated up to the shoulder 33. A locking situation such as this is extremely strong and the structural parts 30 remain firmly in place when the seat 10 is used.

[0034] Figure 19 shows a side view of the structural part 30 of the seat where the figure shows the support trusses. The edge of the structural part 30 is strengthened by making it thicker between the support trusses. The strengthening can be done to another part also.

[0035] Figure 20 shows a structural part 30 seen from the side and equipped with padding 39. The padding can be glued or attached with detachable fasteners to a recess made on the structural part 30.

[0036] The structural part 30 according to the invention has two holes 32, into which the seat frame's tubes or bars are placed when installing the seat. There is a recess in connection with the hole 23, whose shoulder 35 functions as a depression into which fits the head of the screw 28 that will be placed in connection with the outermost structural part.

[0037] The structure of the structural part 30 shown in the figure is open. A structure of this type is typical when the piece is made from plastic by injection moulding in a mould. The structural part 30 can, however, also be made of other material, in which case the shape of the piece can vary.

[0038] In the structure of the seat 10, a spring-like plate 29 has been pushed inside the tube 21, which has, for example, hooks on its edges and a thread in the middle for a screw. The shape of the plate 29 causes the hooks on the edges of the plate to stick to the inner surface of the tube 21 when the screw 28 is tightened. The head of the screw 28 fits the depression in the surface of the structural part 30 and rests on the shoulder at the bottom of the recess.

[0039] The structural part 30 can also have a solid structure especially if it is manufactured from wood, for example. The structural part 30 of the seat 10 according to the invention can also be curved in shape. When such structural parts 30 are used, both the backrest 11 and the seat part 12 can also be made curved and/or cup-like, which are more comfortable when sitting than a straight backrest 11 and a straight seat part 12.

[0040] Padding can be added to the structural parts 30 of the seat according to the invention. The padding can be made of, for example, soft plastic, such as polyurethane, which has been attached to the surface of the structural part 30 by, for example, gluing. In order for the padding to stay in place better, a recess can be formed in the upper surface of the structural part 30 for the padding.

[0041] The structural part 30 of the seat according to the invention can also be coated with a coating. This can be achieved, for example, such that the structural part 30 is immerged in a liquid substance, which, when it dries, forms a protective surface layer on the surface of the structural part 30. The coating 37 can be made thicker at its upper surface, in which case it simultaneously forms a padding on the upper surface of the structural part 30.

[0042] The frame of the seat part 12, which has a hinge 25, is not necessarily at the edge of the seat part 12 but closer to the centre part of the seat part 12. Thanks to this arrangement, the seat part rises up due to the effect of gravity when the seat is not occupied.

[0043] For example, the frame of the seat can be attached to the tiered wall 40 of a seating area of a sports arena.

[0044] The seat can be attached to the tiered wall of a seating area of a sports arena so that several seats 10 are attached to a beam. The seats 10 attached to the beam form a module which can be installed onto the wall quickly in one piece, which considerably speeds up the installation work.

[0045] The number of seats 10 in the module is only limited by the weight of the module and the stability of the structure. However, the modules must be easy to handle and easy to transport to the installation site. In practice, an advantageous module size is, for example, three seats 10. For the duration of the transport, the seat parts of the seats can be detached from the modules, thus reducing their weight.

[0046] The drawings show examples of seats 10 which have two tubes 21 for the backrest 11 and two tubes for the seat part 12. This is an advantageous solution when the seat 10 is meant to seat one person. However, if the seat must withstand a greater weight or if the seat is made into a bench for two or more people, three or more tubes or bars can be used in both the backrest 11 and the seat part 12. Correspondingly, the size of the structural parts 30 changes and/or becomes longer.

[0047] The material, length and shape of the structural parts 30 of the seat 10 according to the invention can vary. In the examples presented above, the structural parts 30 are essentially identical, because this eliminates the need for several different moulds in production. However, according to the invention, there can be several different structural parts 30, which can be combined into different seats of different shapes and/or sizes. In that case, the size and shape of the cross section of the structural part 30 can also vary, for example so that the outermost structural parts are wider than the others.

[0048] The shape and size of the cross section of the tubes 21 or bars of the backrest 11 and the seat part 12 of the seat 10 can also vary. The tubes or bars can be, for example, round, rectangular or flat.

[0049] The manufacturing material of the structural parts 30 of the seat 10 can be, for example, plastic, injection moulded plastic, wood or similar material. The plastic parts can also contain flame-retardant compounds. Paddings or coatings can be attached to the structural parts 30. If required, armrests can also be attached to them.

LIST OF REFERENCE NUMBERS

[0050]

10	Seat
11	Backrest
12	Seat part
20	Frame
21	Tube
23	Beam
25	Hinge
27	Stopper
28	Screw
29	Nut
30	Structural part
32	Hole
33	Shoulder
34	Protrusion
35	Shoulder
36	Support truss
37	Hole's conical surface
38	Protrusion's conical surface
39	Padding

Claims

1. A seat (10) comprising at least two tubes (21) or bars in the frame of the backrest (11) and/or the frame of the seat part (12) of the seat (10) and structural parts (30) that are elongated pieces which have holes (32) for the tubes or bars for installing the structural parts onto the seat such that the tubes or bars go into the structural parts' holes, **charac terised** in that the seat's (10) structural part (30) has at least one protrusion (34), which rests on the adjacent structural part such that a gap remains between the structural parts.

2. A seat (10) according to claim 1, **characterised in that** the protrusion (34) in the structural part (30) of the seat (10) that rests on the adjacent structural part is a bushing in connection with the hole (32) of the structural part, which bushing is located such that the tube or bar comprised in the seat goes through both the hole and the bushing.

3. A seat (10) according to claim 2, **characterised in that** in the structural part (30) of the seat (10) the outer surface (38) of the protrusion (34) resting on the adjacent structural part is conical and the hole (32) of the structural part has a conical surface (37) on which the outer surface (38) of the protrusion (34) rests.

4. A seat (10) according to claim 1, 2 or 3, c**haracterised** in that the structural part (30) of the seat (10) is an elongated piece to which protrusions (34) are permanently fastened.

5. A seat (10) according to any one of claims 1-4, **characterised in that** in connection with the tube (21) or bar of the frame of the backrest (11) and/or seat part (12) of the seat (10) there is a stopper (27) against which the structural parts (30) installed in connection with the tube or bar rest and the hole (32) in the last structural part to be installed in connection with the tube or bar is covered with a plug or fastening member (28) of the structural part.

6. A seat (10) according to any one of claims 1-5, **characterised in that** the fastening member (28) that is in connection with the structural part (30) to be last installed and that is installed at the end of the tube (21) of the frame of the seat's (10) backrest (11) and/or seat part (12) is a fastening screw, and inside the tube, there is anchored a fastening nut (29), to which the fastening screw can be locked.

7. A seat (10) according to any one of claims 1-6, **characterised in that** the structural parts (30) are locked between the stopper (27) and the head of the fastening screw (28) such that the fastening screw (28) squeezes the structural parts (30) against the stopper (27).

8. A seat (10) according to any one of claims 1-7, **characterised in that** the seat (10) is a seat in a sports arena or some other seating area, which has been permanently installed in the seating area's structures and that the tubes (21) of the seat's seat part (12) have been attached to the seat part's frame such that the tubes of the seat part and the structural parts (30) attached to them turn up due to the effect of gravity when the seat is not occupied.

9. A seat (10) according to any one of claims 1-8, **characterised in that** the structural parts (30) of the seat (10) are of different sizes such that the structural parts in the upper part of the backrest and front part of the seat part are wider than the other structural parts.

10. A seat (10) according to any one of claims 1-8, **characterised in that** a padding (35) made of soft plastic has been attached to the structural part (30) of the seat (10) and/or the structural part has been coated with a protective coating layer (37).

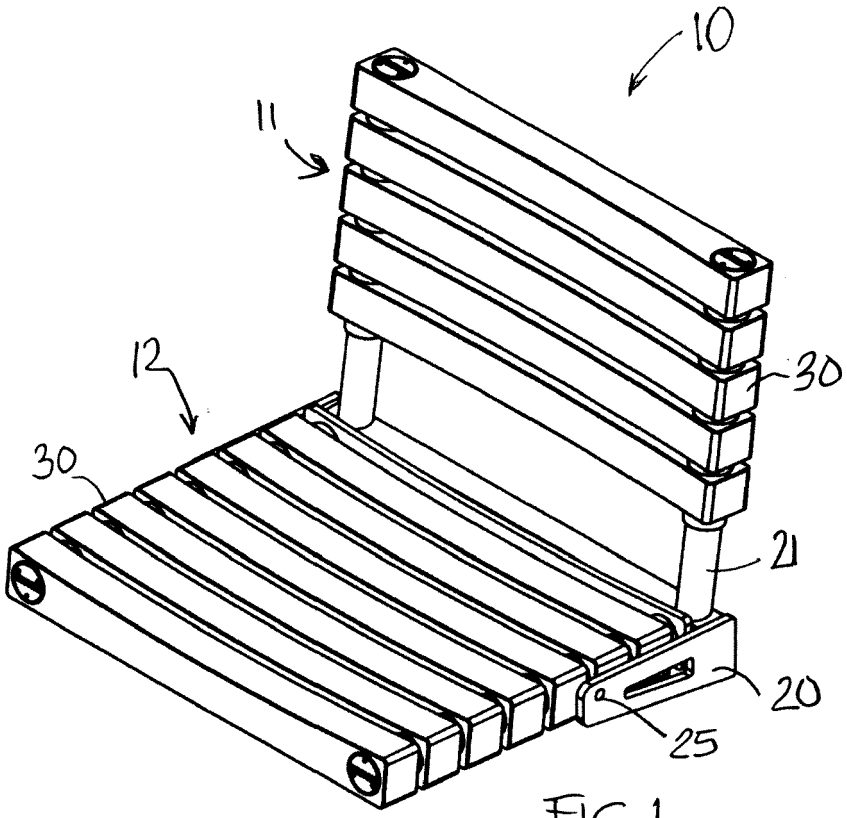

FIG. 1

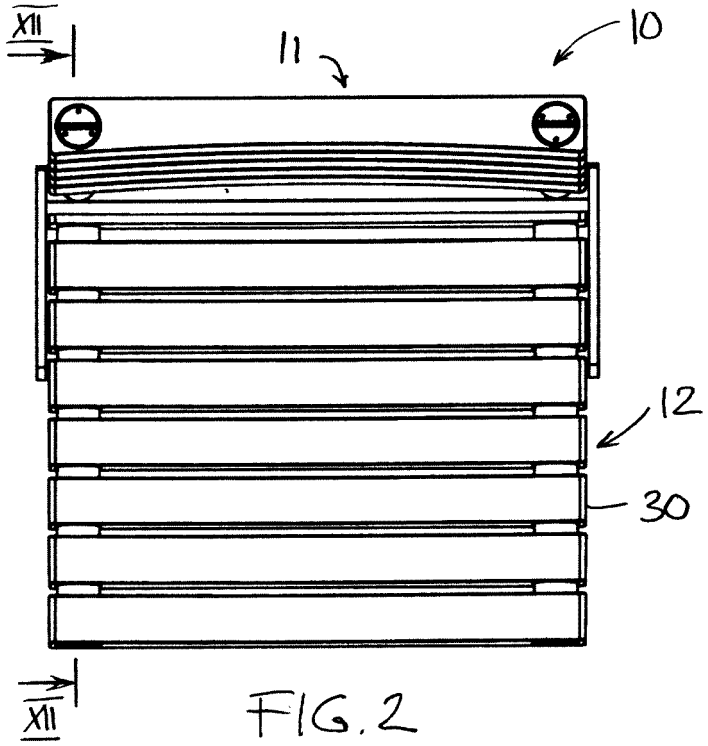

FIG. 2

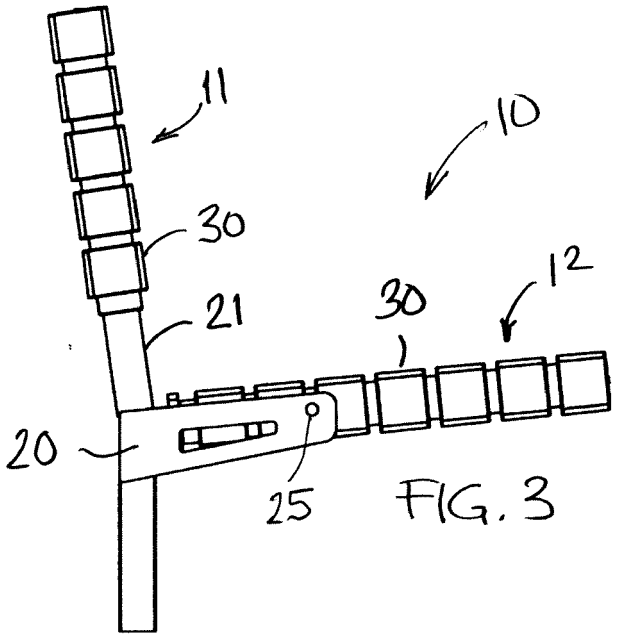

FIG. 3

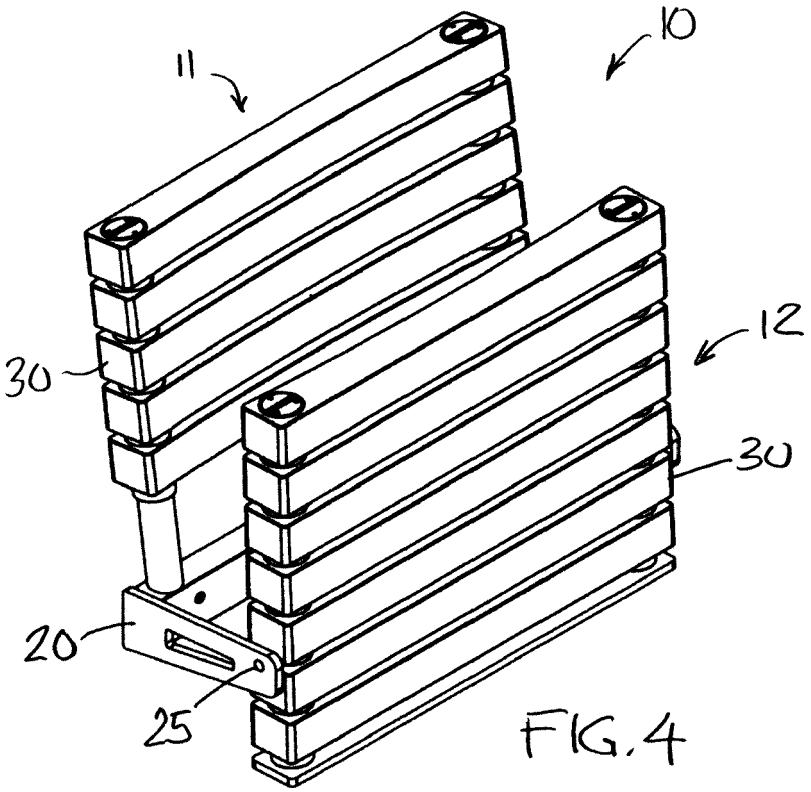

FIG. 4

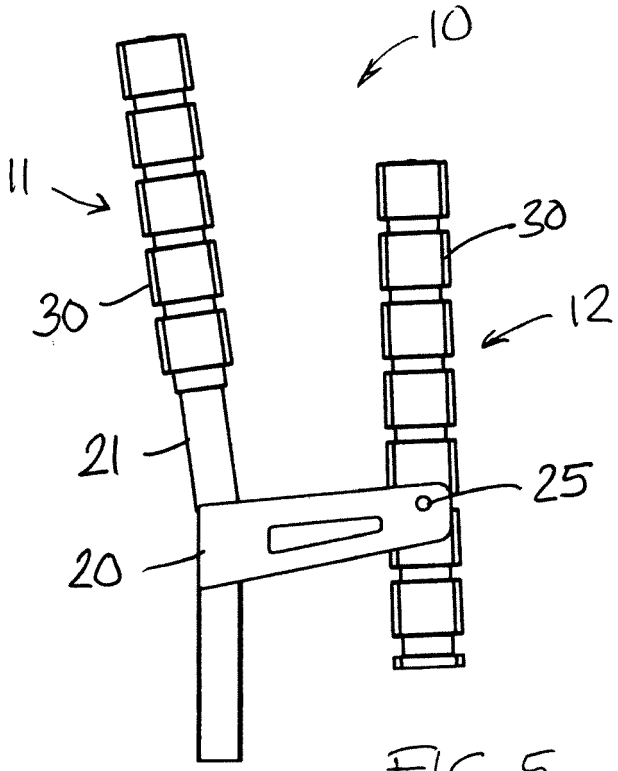

FIG. 5

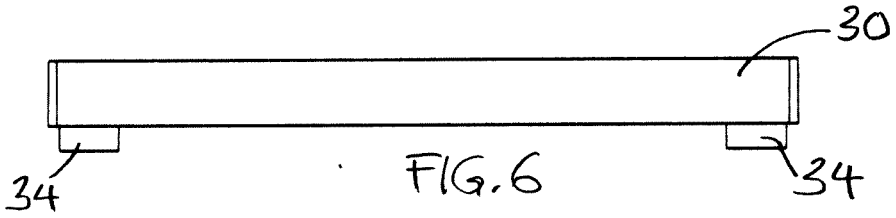

FIG. 6

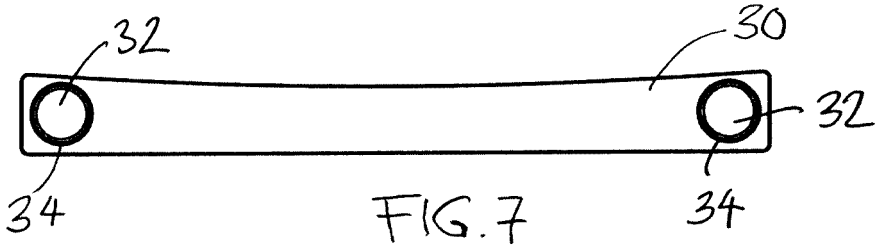

FIG. 7

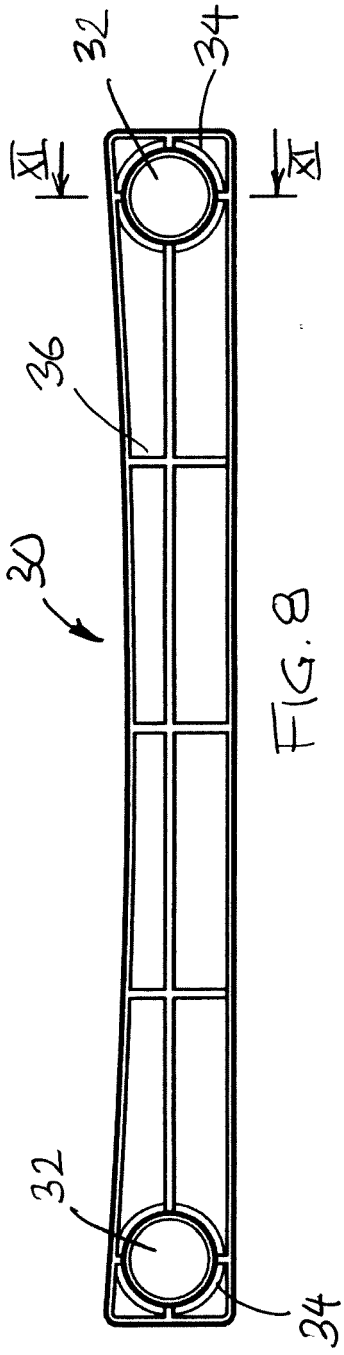

FIG. 8

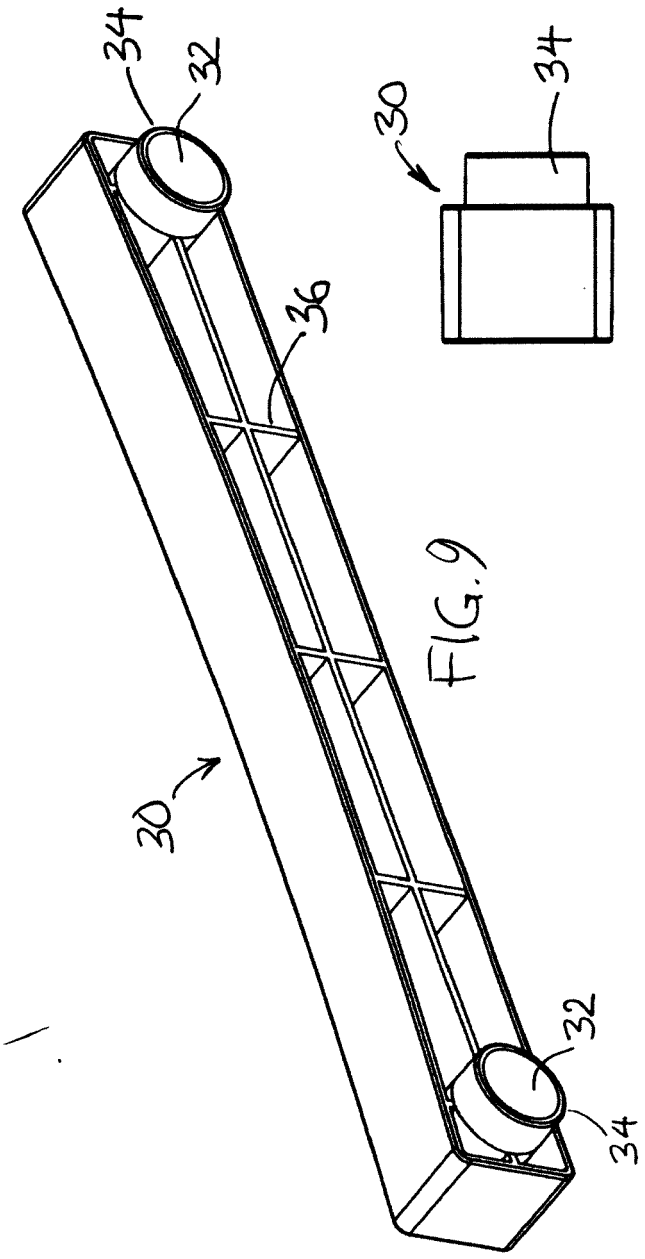

FIG. 9

FIG. 10

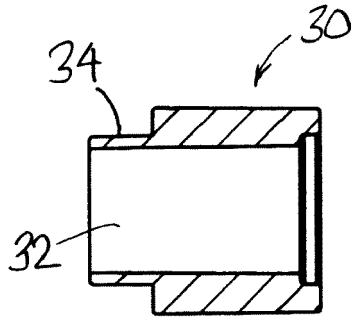

FIG. 11

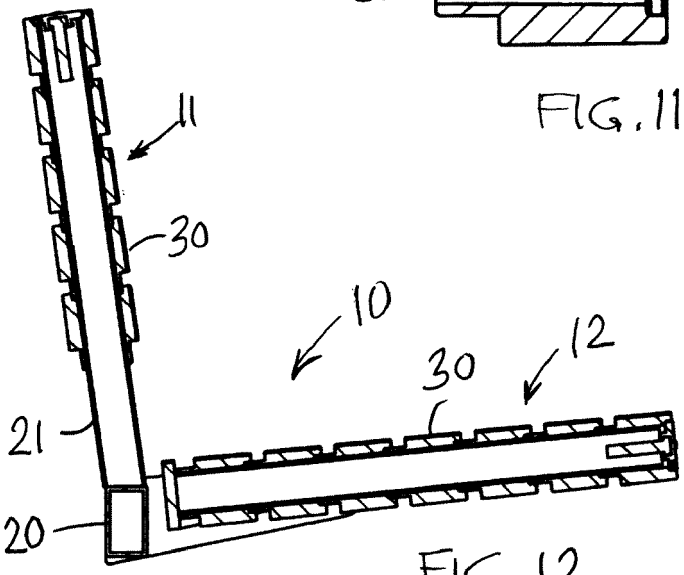

FIG. 12

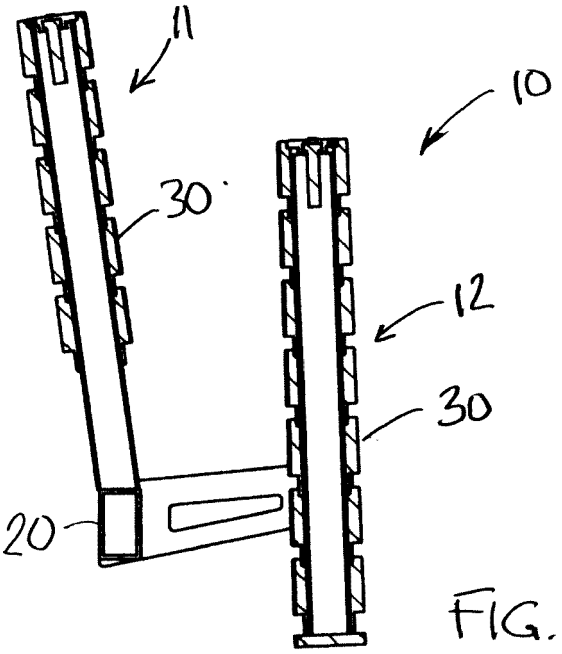

FIG. 13

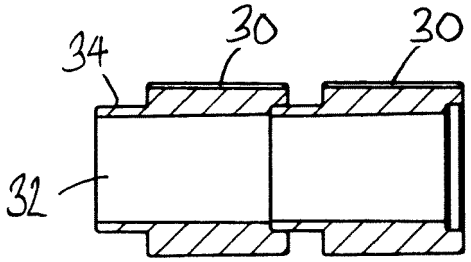

FIG. 14

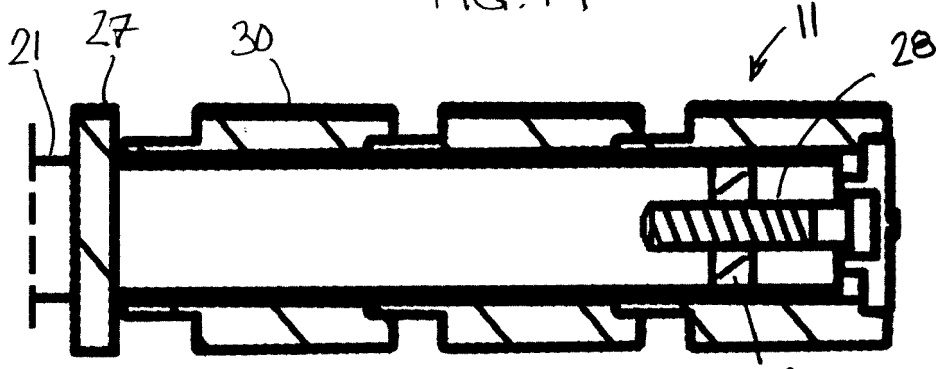

FIG. 15

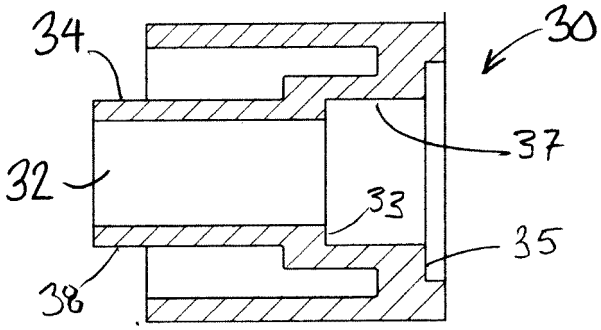

FIG. 16

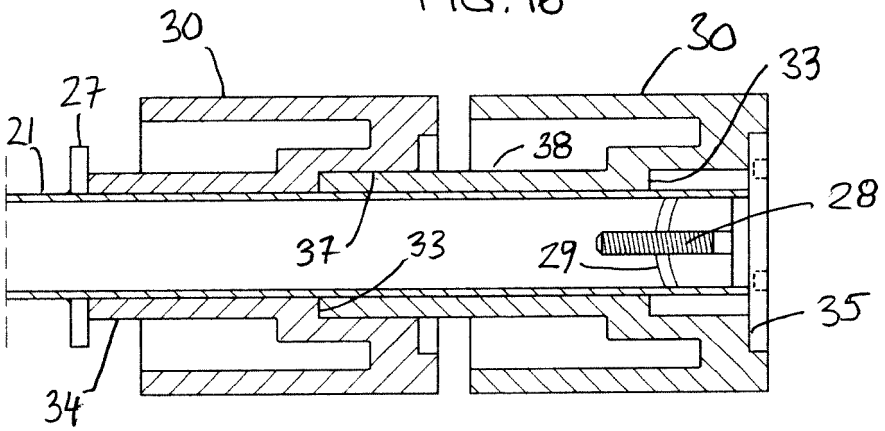

FIG. 17

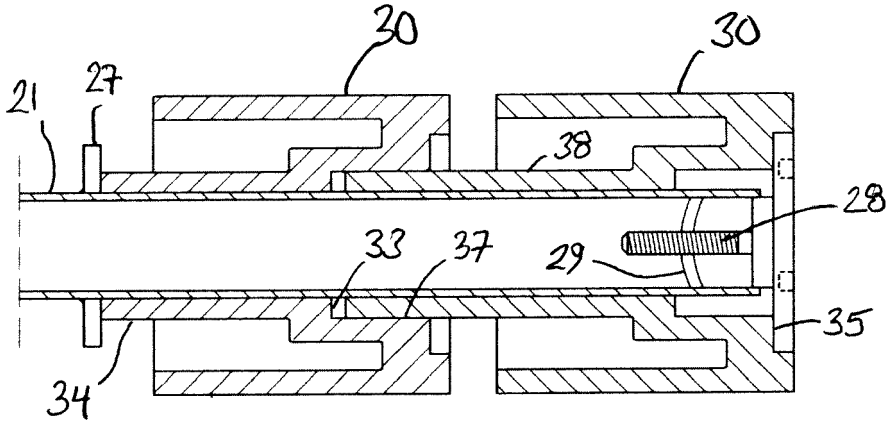

FIG. 18

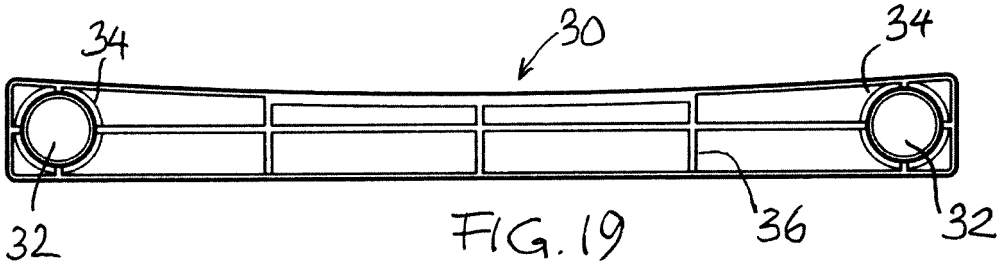

FIG. 19

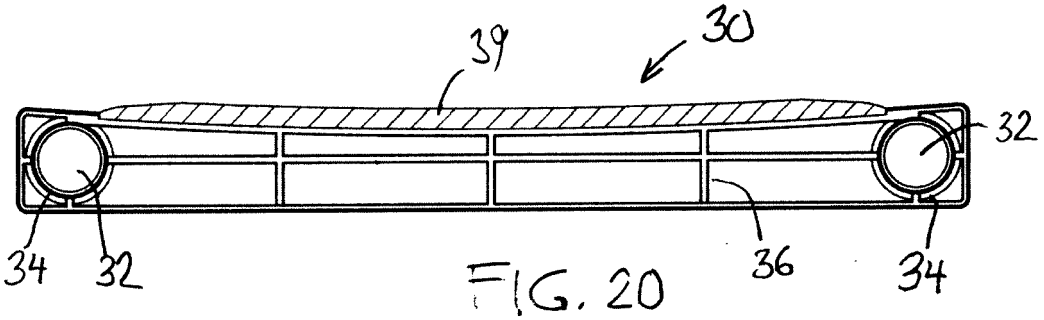

FIG. 20

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EUROPEAN SEARCH REPORT

Application Number
EP 17 39 6003

DOCUMENTS CONSIDERED TO BE RELEVANT

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X	EP 0 267 859 A2 (ANDRE ETIENNE [CH]; JANIN PAUL [FR]) 18 May 1988 (1988-05-18) * column 1, line 28 - column 3, line 45; figures 1-4 *	1,4,5,7	INV. A47C5/04 A47C7/02 A47C7/40 A47C4/02
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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	14 December 2017	Kus, Slawomir

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